Breeding to Adapt Annual Ryegrass (*Lolium multiflorum* Lam.) from a Forage to a Dwarf Turfgrass for Overseeding Sports Fields

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The 21st International Grassland Congress / 8th International Rangeland Congress took place in Hohhot, China from June 29 through July 5, 2008.

Proceedings edited by Organizing Committee of 2008 IGC/IRC Conference

Published by Guangdong People's Publishing House

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Key Words: turfgrass, annual ryegrass, Lolium multiflorum

Introduction Annual ryegrass (*Lolium multiflorum* Lam.) is recognized as a forage grass grown during the cool-season in much of the higher rainfall regions of the southern USA. Seed production of annual ryegrass, sometimes called Italian ryegrass, is almost exclusively in the state of Oregon. The use of annual forage-type ryegrass for turf is not recommended due to its rapid spring growth, which requires mowing two or three times per week. A ryegrass forage breeding program has been underway at our research center since 1971. Prior to 1991, small or dwarf-type plants were discarded because they had not demonstrated high forage biomass potential.

Materials and methods In 1991, we began selection of slower growing and dwarf-type annual ryegrass plants to determine their potential as turfgrass. The base populations were from forage type diploid ryegrass cultivars such as Gulf, Marshall, and TAM 90. Ryegrass populations had been planted as space plants in several isolation nurseries. Eighteen dwarf stature plants exhibiting a high number of tillers and narrow leaves were selected and transplanted into an isolation block. They were allowed to cross-pollinate and produce seed. The seed from all 18 plants were bulked together and 450 plants from that bulk were planted in 1992 as a space planted nursery. Two hundred plants of this population demonstrating normal plant height and wide leaves were eliminated from the population. Some plants were also eliminated due to light green leaf color, leaf-tip freeze injury, and susceptibility to crown rust (*Puccinia coronate* Corda.). At the end of the growing season about 200 remaining plants were allowed to cross-pollinate and produce seed. In 1997, a space planted seed increase of 0.33 ha was grown near Lebanon, Oregon. Approximately 5% of these plants were eliminated because of non-dwarf characteristics. This population was released by the Texas Agricultural Experiment Station as Axcella turf-type annual ryegrass in 2000. Since that time we have continued to select for more dwarfy plants with darker green color, high tillering, and narrow leaves.

Results and discussion Turf-type annual ryegrass is normally overseeded onto warm-season turf grasses such as bermudagrass (*Cynodon dactylon*) when the turf has gone dormant at first frost in the autumn. High seeding rates of from 4 to 10 kg/100 m^2 (10 to 20 lb/1000 sq. ft.) are required in conjunction with several days of rainfall or daily irrigation to germinate the seed and allow for establishment in the sod. Overseeding trials are conducted annually at Overton to compare annual with perennial ryegrass cultivars for turf quality and many other attributes including, establishment and transition date. Table 1 provides a brief overview of some important data collected annually.

Table 1 *Turfgrass ratings for quality (9= best), turf color (9= best), turf height, 5 days after mowing at 2 cm and transition (death of plants) of annual (AR) and perennial (PR) ryegrass during spring of 2007 at Overton, Texas.*

Cultivar	Turf Quality 22-Feb 0-9	Turf Color 3-Apr 1-9	Turf Ht 7-Mar cm	Ryegrass Remaining in Turf		
				18 May	12 June	11 July
				Percent		
Gulf AR	5.0	4.7	6.0	43	0	0
Panterra AR	7.3	6.0	4.0	40	0	0
Axcella 2 AR	7.0	6.3	3.3	40	0	0
League Master PR	6.3	8.7	3.0	96	93	28
VIP[3] PR	7.7	9.0	3.9	95	96	25
LSD (0.05 level)	1.0	0.98	1.0	19.7	3.4	24.1

Conclusions This program has resulted in the release of the cultivars Panterra in 2003 and Axcella 2 in 2006 which are significantly improved for turf quality compared to Axcella. Above results indicate major differences between annual ryegrass (AR) and perennial ryegrass (PR). Turf quality of AR and PR are similar until April and May when PR has better quality turf. Turf color of improved AR such as Axcella 2 and Panterra are much improved compared to Gulf, but still have a lighter green color than PR ryegrass. Annual ryegrass dies or transitions out of turf about 1 month earlier than PR, thereby allowing the warm-season turfgrass to transition back in with much less competition.